Original Article

Effectiveness of a Pre-conception Care Intervention on Reproductive Health Behaviors among Women of Childbearing Age in the Community

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ABSTRACT

OBJECTIVE: This study aimed to evaluate the effectiveness of pre-conception care intervention, based on the study guidelines, in improving reproductive health of behaviors among women of childbearing age in community health centres.

METHODOLOGY: A quasi-experiment with a pretest and posttest, using an intervention and control group. The study was conducted from April to December 2021. Fifty women of childbearing age were randomly selected and assigned to intervention and control groups. The inclusion criteria included women aged 17-40 years who lived within the Medan Sunggal Health Centre area and visited maternal and child health services during the study. Participants were non-pregnant and provided written informed consent to participate in all stages of the intervention. The intervention consisted of three structured educational sessions delivered through nurse-client communication and goal-oriented counseling. Behavioural outcomes were measured using the validated pre-conception care assessment questionnaire (Cronbach's alpha = 0.80-0.90). Data were analyzed using paired t-tests and independent t-tests.

RESULTS: The intervention group showed a significant improvement in pre-conception care behaviors (mean difference = -9.08, 95% CI: -10.22 to -7.93, p = 0.035), while the control group showed no significant change (p = 0.228). Between-group comparisons revealed significant differences at both pretest and posttest (p < 0.001; p = 0.004).

CONCLUSION: Structured pre-conception care interventions based on nurse-client communication and goal-oriented education improve women's readiness and decision-making for healthy pregnancies and are recommended for use in community health centres.

KEYWORDS: preconception-care, intervention, maternal reproductive health

INTRODUCTION

Women's health services are a key target of government support to improve care for childbearing age women, both before and during pregnancy. A healthy pregnancy requires proper planning and personal decisions to help mothers avoid the risk of infections and pregnancy complications. Pre-conception care becomes one of the very important aspects for mothers in preparing for a healthy pregnancy[1]. A study reports that only 23% of the respondents knew and had consumed nutrients containing folic acid during pre-conception, and women who undergo their first pregnancy have experienced an eating disorder[12]. This condition will certainly affect changes in their body weight and unstable emotional state[17]. Pregnancy planning through healthy behaviors of childbearing age women, maternal pre-conception care can prevent disease risk and improve maternal health in the long term.

Comprehensive pre-conception care interventions, in line with WHO standards, are carried out to ensure the mother and her partner are in the best possible physical and emotional health at the beginning of the pregnancy[1]. The COVID-19 pandemic has impacted maternal care, child health services, and family planning at health centres, clinics, and all public health service settings[21,22]. Access to childbearing-age women has changed in the health care system, with scheduled clinic visits limited by mother-child health care regulations[3]. In addition, the limitations of routine maternal health care, the reduction of maternal and child health care activities, and the need for additional examinations following health protocols during the covid-19 pandemic[4].

There is a decrease in visits of childbearing-age women to Integrated service care, community health centres, and other health care facilities for various reasons. They were worried about contracting Covid-19, even though the government has put in place effective measures to reduce the risk of infection. These disruptions in pre-conception and reproductive health services may have long-term implications for maternal and neonatal outcomes. Inadequate pre-conception care can increase the risk of unintended pregnancies, maternal health complications, including anemia, which can affect fetal health and lead to low birth weight and developmental problems. Therefore, strengthening pre-conception health services is crucial

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to ensure optimal maternal preparedness and prevent obstetric complications in future pregnancies.

Based on this, concrete efforts through *nursing practice interventions are carried out to improve maternal health behaviours* during preconception[5]. Childbearing-age women in nursing interventions can improve maternal health and reduce disease risk during embryonic growth in the womb[6]. WHO policy brief Caring for pre-conception explains that there are thirteen packages of pre-conception care intervention programs that must be provided to women to prepare for a healthy pregnancy[1,2]. Pre-conception educational interventions were developed from King's Theory of Goal Attainment, which includes five of the eleven key elements: *personal system* (perception) and the *interpersonal system* (communication, interaction, transaction, and decision-making). According to previous studies, this theoretical approach is effective in enhancing clients' knowledge, self-awareness, and health behaviors, and can be successfully applied to pre-conception care programs[7,8]. Nurses and health workers play a role in facilitating increased visits by mothers and providing easy access to maternal health services, which encourage the achievement of maternal health outcomes during the COVID-19 pandemic[9,10]. Therefore, this study was conducted to evaluate the effectiveness of pre-conception care interventions in improving reproductive health behaviors of women of childbearing age in community health centres.

METHODOLOGY

The pre-conception care intervention was implemented at the integrated service at the Medan Sunggal Community Health Centre in Medan, Indonesia. The study was conducted from April to December 2021. This study employed a quasi-experimental design to evaluate the effectiveness of a pre-conception care intervention among women of childbearing age. The research process included preparatory stages, intervention delivery, and post-intervention evaluation, all conducted in collaboration with community health workers to ensure contextual relevance and participant engagement.

Study Design

The study design was a quasi-experiment using a pretest-posttest control-group approach to evaluate the effectiveness of the pre-conception intervention among women of childbearing age. The study population consisted of women of childbearing age who attended maternal health care services at the community health centre.

Population and Sampling

The sample size was determined using hypothesis tests with a significance level of $\alpha = 0.05$ and $\beta = 0.2019$, resulting in 25 respondents in each group of intervention and control groups. The number of potential 30% dropouts and the total sample were increased to 50 respondents, comprising 25 in the intervention group and 25 in the control group. Respondents were selected using a random sampling technique, with the inclusion criteria being women of reproductive age (17-40 years) who lived in the working area of the Medan Sunggal Health Centre and visited maternal and child health services during the study. They were selected if they were not pregnant and were willing to participate in all stages of the intervention study by signing an informed consent form. Eligible participants were first selected using a purposive approach, based on some of the criteria, and subsequently randomized to either the intervention of the control group. Randomization was conducted using a simple randomization method, in which participants were allocated to groups at random. In this case, the allocation sequence was kept in a sealed envelope to prevent selection bias.

Instrument

This research instrument consists of 2 parts: Demographic Data Questionnaire and the Pre-conception Care Assessment Questionnaire. Pre-conception Care Intervention uses an Information Module consisting of of items from the WHO pre-conception care intervention programs to measure pre -conception care behaviour among childbearing-age women. The instrument was modified based on the development of the conceptual framework of women's behavior in pre-conception care[1,13]. Research instruments are validated by experts in their field and internal tests of consistency with alpha coefficient results of 0.80-0.90[11].

Research Procedure

Intervention assessment is carried out for 30-50 minutes during each of 3 meeting sessions. The meeting becomes a stage of intervention, thereby strengthening the intervention of pre-conception treatment. The control group received pre-conception care interventions in integrated service care or at a community health centre, as usual, using educational media available in accordance with the community health centre's standards and providing education in line with health care guidelines, without a structured program. At the end of the research, the control group will receive the same treatment as the intervention group. This study was conducted through five steps, including participant selection, group randomization, intervention, follow-up, and post-study equivalency and ethical considerations, as described following:

1) Participant Selection: eligible participants were recruited based on inclusion and exclusion criteria. A total of 50 women of childbearing age (17-40) who visited the maternal and child health services at the Medan Sunggal Community Health Centre (Puskesmas). Participants who met the criteria signed an informed consent form.

2) Randomization: after enrollment, then randomization was carried out, and respondents were placed into two groups, namely: the intervention group of 25 people, who received a structured pre-conception care education program developed by the researchers. The control group of 25 people received

routine pre-conception health education provided at the Integrated Health Post (Posyandu) or the community health centre (Puskesmas), in accordance with standard government health guidelines. Randomization was performed using a list of concealed random numbers, each in a sealed, opaque envelope.

3) Intervention Phase: the intervention consisted of three education sessions, each lasting 30-50 minutes, using a pre-conception care guidebook. The sessions included educational materials, interactive discussions, and feedback to increase knowledge, awareness, and action toward healthy pre-conception practices. The control group continued to receive care as usual without additional structured guidance.

4) Follow-up Phase: Both groups were monitored to ensure participation and continued attendance at the third session. Researchers recorded participant attendance, feedback, and responses to evaluate adherence and engagement in the intervention.

5) Post-Study Equivalency and Ethical Considerations: After the study was completed, the control group received the same structured educational materials as the intervention group to ensure ethical fairness and equal access to information.

Data Analysis

Data analysis in this study used predetermined statistical tests of compare the intervention group with those of the control group and assess the effectiveness of the pre-conception education intervention. Univariate analysis is used to identify respondents' characteristics based on collected demographic data. Bivariate analysis was conducted using a t-test to compare pretest and posttest mean scores for the intervention and control groups on the behaviour of childbearing-age women in pre-conception care. The final model's fitness was assessed using Levene's test and a classification table. This was presented as crude and adjusted odds ratios with 95% CI, and the p-value < 0.05 was significant, except for the analysis in the intervention group, which had a p-value < 0.001.

Ethical Statement

The Agency granted research permission for the Research and Development Medan City Government with the Letter No. 070/3085/Balitbang/2021, dated September 15, 2021, and for the Medan Sunggal Community Health Centre with the Letter of Permission No. 070/439, dated October 29, 2021. Before data collection, all respondents provided informed consent to participate in the research. Participants were informed that their participation was a form of assistance without any compensation and that if they did not wish to continue, they could withdraw without consequences. The privacy and confidentiality of participant information were strictly maintained. The implementation of research activities followed the principles of standard research ethics. Upon completion of the study, the control group received additional educational sessions to ensure equal access to the knowledge and skills gained through the intervention.

RESULTS

Respondents' Characteristics

Table I: The characteristics of women of childbearing age in taking pre-conception care in the intervention and control group (n=50)

Characteristics	Intervention n (%)	Control n (%)
Age (years old)		
17-21	3 (12)	4 (16)
22-30	19 (76)	17 (68)
31-36	3 (12)	4 (16)
Number of children		
0-1	12 (48)	11 (44)
2-3	10 (40)	11 (44)
4-5	3 (12)	3 (12)
Ethnic (culture)		
Batak	8 (32)	8 (32)
Javaness	9 (36)	8 (32)
Minang	4 (16)	4 (16)
Aceh	4 (16)	5 (20)
Religion		
Muslem	21 (84)	20 (80)
Christian	4 (16)	5 (20)
Education		
Elementary School	6 (24)	7 (28)
Primary School	3 (12)	3 (12)
High School	11 (44)	10 (40)
University	5 (20)	5 (20)
Work		
No Work	12 (48)	16 (64)
Employe	3 (12)	3 (12)
Others	10 (40)	6 (24)
Visiting health care		
None	6 (24)	4 (16)
Clinic/doctor/midwifery	10 (40)	13 (52)
Health Centre	9 (36)	8 (32)

Table I presents the demographic data; most respondents were aged 22-30 years, comprising 76% in the intervention group than 68% in the control group. Nearly half of the participants had 0-1 child, suggesting that they were in the early reproductive phase and had limited parenting experience. The majority ethnicities were Javanese (36%) and Batak (32%), reflecting the local cultural composition. Most participants were Muslim and had completed high school, which may have contributed to their basic

understanding of health information. However, a considerable proportion were unemployed (48%-64%), potentially affecting their access to health information and decision-making autonomy. Health service utilization differed between groups: 76% of the intervention group had visited maternal and child health services, compared to only 32% in the control group. These characteristics support the relevance of pre-conception education, especially for women with limited health access and decision-making power.

Analysis in the intervention group

Table II: Paired t-test Analysis of Pre-conception Care Behavior in Intervention Group

Group	Test Phase Comparison	*p*-value	Mean Difference	95% CI
Intervention	Pretest vs Posttest	0.035 (p<0.001)	-9.08	-10.22 to -7.93

Based on the **Table II** reported analysis, a paired t-test for childbearing-age women pre-test and post-test for the intervention group showed a significant difference ($p = 0.035$; $p < 0.001$). This means that, statistically, there is a difference in the average score before and after the intervention. There was a change in the behavior of pre-conception care of childbearing age women after treatment with pre-conception care intervention with the value obtained, there is a difference of -9.08 (CI 95%-10.22 to -7.93).

Paired t-test analysis in the control group

The results of the study in **Table II** on maternal behaviour in childbearing-age women pre-conception care intervention, based on analysis of paired t-tests in the mother-childbearing-age women pretest and posttest control groups, show no significant difference ($p=0.228$, $p>0.05$). In this study, there was no difference in the mean score of the control group's mean score among childbearing-age women with pre-conception care behaviour after the pre-conception care intervention.

Independent analysis of the t-test intervention groups and control groups

Table III presents the independent t-test results of pre -conception care behavior among women of childbearing age. Levene's test showed $p < 0.001$, indicating unequal variances between groups. The pretest results showed a significant difference ($p < 0.001$; MD = -5.64; 95% CI: -7.87 to -3.40), while the posttest results also revealed a significant improvement in the intervention group ($p = 0.004$; MD = 3.68; 95% CI: 1.28 to 6.07). These findings indicate that the pre-conception care intervention effectively improved women's health behavior compared with the control.

DISCUSSION

To evaluate the effectiveness of a structured pre-conception care intervention in improving reproductive health behaviors among women of childbearing age during the Covid-19 pandemic, a previous study found that low awareness of mothers to carry out pre-conception examinations and care, leading to unpreparedness for pregnancy and potential risks such as maternal complications, preterm delivery, and poor outcomes[2,8]. The low early awareness of reproductive health care, especially regarding nutritional and behavioral preparation, can increase the risk of chronic energy deficiency, anemia, and maternal morbidity[1]. Social factors such as age, employment, and educational level also influence women's readiness for pre-conception care, indicating the need for targeted and structured interventions. Women who are young, unemployed, or have low educational attainment are less likely to prepare adequately for healthy pregnancies[1,12]. Respondents' characteristics will affect the pre-conception interventions provided to childbearing-age women. Young women who are not working or on a low income were found to have low readiness for pre-conception nutrition[12]. The statement can be interpreted with a variety of backgrounds; it is necessary to provide pre-conception treatment interventions.

Therefore, providing systematic, continuous education on pre-conception health is essential to improve awareness and readiness among mothers. The study reported that structured pre-conception care interventions effectively improved women's knowledge, awareness, and self-care behaviors[11,16]. Through educational materials, interactive discussions, and personalized feedback, participants demonstrated greater motivation and confidence in adopting healthy lifestyles and in utilizing maternal health services. These results indicate that the intervention strengthened cognitive understanding and behavioral commitment, which are key domains in health education[16]. Moreover, the observed positive changes align with King's Theory of Goal Attainment, which emphasizes that mutual perception, communication, and interaction between nurses and clients lead to the achievement of health goals. The face-to-face delivery method also allowed nurses to provide direct reinforcement and emotional support, fostering trust, accountability and decision making of client to come to health care.

The outcomes align with King's emphasis that the perception, communication, and interaction of nurses

Table III:
Analysis of the Independent t-test of Pre-conception Care Behavior among Women of Childbearing Age

Test Phase	Group Comparison	Levene's Test (Sig.)	p-value	Mean Difference	95% CI
Pretest	Intervention vs Control	p < 0.001	< 0.001	-5.64	-7.87 to -3.40
Posttest	Intervention vs Control	p < 0.001	0.004	3.68	1.28 to 6.07

and clients lead to the achievement of health goals. That transaction and decision-making are important for changing behaviour *clients*[7,10]. The theory highlights that behavioral change is achieved through shared understanding and reciprocal decision-making between the nurse and the client. The face to face approach used in this intervention enabled nurses to provide immediate reinforcement, clarification, and emotional support, fostering trust and accountability. This personal and interpersonal engagement was particularly valuable in building women's confidence and self-efficacy to sustain healthy reproductive implementation. During the period of the pandemic, changes in mothers' access to services and restrictions on clinical visits due to health regulations posed significant challenges to pre-conception care attendance. Despite these limitations, many women continued to visit community health centres for follow-up visits, reflecting improved awareness and a stronger behavioural commitment fostered by the intervention.

These findings highlight the importance of maintaining two-way communication between healthcare providers and clients. Such interaction not only helps address fear, misinformation, and negative perceptions of infection risk but also reinforces motivation and compliance with maternal health recommendations[21]. Strengthening communication strategies and adaptive intervention methods is therefore essential to sustain women's engagement with community services beyond pandemic conditions. The communication-based, goal-oriented educational approach used in this study successfully mitigated barriers caused by limited clinic access. It demonstrated that consistent nurse-client interaction remains central to maintaining behavioural change in community settings [7,22].

The integration of structured education, nurse-client interaction, and cultural sensitivity continues to be a promising model for achieving sustained improvements in maternal health readiness and reproductive outcomes[21]. Cultural characteristics embedded within the community also influenced the effectiveness of the intervention. Local cultural settings, family structures, and kinship systems play a central role; in women's health decision-making. Health behaviors, including pre-conception practices, are often shaped by cultural values that emphasize respect, mutual support, and family consensus. Integrating culturally sensitive elements, such as the use of local language, involvement of spouses and family members, and alignment with community values, enhanced women's trust, participation, and understanding of pre-conception care.

These culturally responsive strategies strengthened behavioural change and supported the sustainability of health practices at the community level[15,20]. When nurses acknowledge and respect these cultural dimensions, they create mutual trust and enable collaborative goal-setting between clients and health workers[14]. The integration of cultural understanding bridges professional nursing knowledge and local wisdom, leading to more meaningful goal attainment and improved reproductive health behaviors[7,21]. Behavioral changes following the intervention were also associated with increased nutritional awareness and improved reproductive planning. Previous studies have shown that women with better pre-conception knowledge are more likely to maintain adequate nutritional intake, consume folic acid, and adopt healthier diets, factors strongly associated with improved maternal and fetal well-being[12,17]. Women who undergo pre-conception education are also better prepared to modify their lifestyle by reducing smoking, alcohol, and caffeine consumption and increasing the intake of fruits and vegetables. These changes can improve maternal health but also contribute to positive pregnancy outcomes[1]. Educational interventions that emphasize balanced nutrition and weight management can alleviate fears about excessive weight gain during pregnancy while promoting healthy physical activity[18,20].

Moreover, the implementation of health education during the pre-conception period has a preventive function by addressing nutritional deficiencies before conception. Women with low awareness or those who perceive pre-conception information as unnecessary often experience nutritional imbalances and poor pregnancy outcome[6]. This study was designed using a rigorous methodological framework, including an appropriate sample size determination to ensure adequate statistical power in detecting meaningful behavioral changes resulting from the intervention[18]. The study reported that systematic education programs, supported by nurse-client interaction, can enhance awareness of nutritional adequacy and empower women to plan for healthier pregnancies. Pre-conception care serves not only as a preventive measure but also as an empowerment strategy for women of reproductive age to manage their own health actively and culture care[19].

Overall, this study demonstrates that structured, theory-based pre-conception interventions significantly improve reproductive health behaviors, even under challenging conditions such as the Covid-19 pandemic. The intervention's effectiveness is strengthened by culturally responsive implementation and the use of face-to-face communication strategies that enhance trust and engagement[19]. These findings support the integration of structured education, communication, and cultural sensitivity into community -based pre-conception programs. The results also provide evidence that King's Theory can be effectively applied to guide nursing interventions in reproductive health, emphasizing that goal-oriented communication and shared decision-making are essential to achieving positive behavioral outcomes[7].

CONCLUSION

This study demonstrated that a structured pre-conception care intervention significantly improved

Reproductive health behaviors among women of childbearing age. Effective nurse-client communication and goal-directed education enhanced women's awareness, decision-making, and readiness for healthy pregnancies. Although limited by sample size and setting, the findings provide valuable insights but may not be generalize to all populations.

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Data Sharing Statement: The corresponding author can provide the data proving the findings of this study on request. Privacy or ethical restrictions bound us from sharing the data publicly.

AUTHOR CONTRIBUTION

All authors have contributed to research ideas, participated in data analysis, discussed the interpretation of results, and drafted the publication manuscript, providing important input.

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